

EDITORIAL ARTICLES.

ON THE PRINCIPLES OF TREATMENT OF SUPPURATION IN CAVITIES WITH RIGID WALLS, WITH SPECIAL REGARD TO EMPYEMA OF THE PLEURA.¹

The treatment of acute abscesses in the soft parts is perfectly well established and consists in opening the abscess and allowing the pus to escape, and if the opening be not at the most dependent point, a second incision is made at that point.

Entirely different is the procedure yet employed by many surgeons with regard to the treatment of suppuration in cavities with rigid walls. Such abscesses are opened late by a single incision at an unsuitable locality for drainage, and as all the pus cannot escape its removal is accomplished by more or less continual irrigation. This irrigation is tiresome to the patient and is a mechanical impediment to the healing process.

A rational surgical procedure is, 1st, that every collection of pus in a cavity with rigid walls should be opened early; 2d, that the incision should be made at the most dependent point, and in large cavities be a double one; 3d, that the washing out should be restricted to the greatest possible degree.

The suppuration in cavities with rigid walls is divided into two groups, first, that in which only one wall is rigid and the other is composed of an expansible organ, and, second, that in which the cavity is entirely, or almost entirely, surrounded by bone.

1. *Suppuration in cavities with only one rigid wall.*

The chief representative of this group is the purulent pleuritis or empyema, not only on account of its frequency, but also on account

¹Prof. E. KUESTER (Berlin), *Deutsche Medicin. Wochenschrift*, Nos. 10, 11, 12, 13, 1889.

of the large amount of fluid which is formed, and the dangers to health and life which accompany it.

In empyema one of the walls is formed by the ribs and intercostal soft parts, the other the more or less compressed lung and the diaphragm, and besides, on the left side, the pericardium. The very large cavity at times remaining after the removal of the fluid can only be filled either by a diminution of the thoracic wall, or by a re-expansion of the lung, or by both together. The diminution which takes place by the moving upwards of the diaphragm on the one side, as well as the sinking in of intercostal spaces and the over-lapping of the ribs on the other, is not inconsiderable, but does not suffice to close the cavity. And if expansion of the lung does not take place a cure can not be effected without artificially diminishing the thorax.

The re-expansion of a compressed lung is not possible after a certain time, which is longer in young people than in the aged. In the latter, the longest time is three or four months, whilst in children re-expansion occurs sometimes after the lapse of almost a year. Rational therapeutics must therefore strive for re-expansion of the compressed lung, and this is obtained by the earliest possible evacuation of the fluid and by making the incision at a point where the pus has a free and unopposed outlet. Physicians have, with more or less success, treated empyema by means of repeated puncture with a trocar, but in 1875 Roser made a plea for treating the disease by resection of the rib;¹ this was followed by Bunn and Koenig. The latter, at the German Surgical Congress of 1878, made a plea for the treatment of empyema by the resection of the rib, or the operation now known as Estlander's, which was only published by that author in 1879.

In 1877, in his book entitled "Five Years in the Augusta Hospital," Kuester laid down the following principles:

1. In fresh empyema, where prompt re-expansion of the lung is expected, a double incision is made and short drainage tubes are introduced.
2. If the empyema be older and re-expansion of the lung retarded the ribs sink together and compress the drainage tube; it is necessary to

¹Centralblatt f. Chirurg. No. 38, 1875.

resect a neighboring rib, better the one near the posterior wound, in order to prevent retention. The rib should be resected at the lowest point in the back.

3. In thoracic fistulae which give only very slight hope of re-expansion of the lung, it is necessary not only to look out for free drainage, but also to reduce the size of the thorax, and to accomplish this one or two ribs are resected on the anterior and one or two on the posterior side of the chest. This operation is, as a rule, very easy, as the thickened periosteum is easily loosened from the bone. The wound is to be treated openly with the introduction of a drainage tube transversely through the chest. Subperiosteal resection of a rib in a child is generally followed by complete bony reproduction.

These rules have been but little altered by Prof. Kuester; the only alteration is that in early empyema he now resects a rib, because retention may occur.

He lays particular stress on seeking out the most dependent point in the back, because only in this way will troublesome manipulations be avoided.

The mode of procedure employed by Prof. Kuester is as follows: In a simple case after a preliminary exploratory puncture he makes an incision on the anterior side of the thorax, in the fourth or fifth intercostal space along the upper border of the rib, and while the pus is freely escaping he passes a long probe in the thorax and seeks the most dependent point and then presses on the probe so that its point will be felt in the intercostal space, he then resects a piece of the superjacent rib. If on opening the pleura a pocket is seen between the diaphragm and chest wall the incision is prolonged downwards and outwards and enough of the rib is resected till the diaphragm is on a level with the opening. The incision should be large enough to allow a good view into the thorax.

After washing out the cavity with a solution of salicylic acid and removing the fibrinous clots with a sponge, a long drainage tube is passed through the two openings and fastened externally. Iodoform gauze is placed loosely in the wound and a moss dressing is applied, which rarely needs to be changed before a week. In eight days the

transverse drainage tube is removed and is replaced by a small one introduced at the posterior wound. If the lung expands rapidly the case will be cured in from three to six weeks.

If the case should be one of encapsulated empyema, the lower border of the collection of pus is made out by physical examination or exploratory puncture, and a rib is resected at the most favorable point for drainage. If the collection of pus is not very large one incision will suffice, because the cavity can be loosely packed with iodoform gauze.

The most difficult conditions are found after long continued suppuration, attending either a thoracic or bronchial fistula. Here it is necessary to considerably diminish the size of the thorax, as the lung will not re-expand, or will do so only very slowly. He treats these cases by resecting the rib above and below the fistula, he then examines the condition of things within the thorax, and resects one or two ribs at the posterior and most dependent point, and passes a drainage tube transversely through the chest. Drainage here is of special importance and must be maintained till the chest cavity has retracted. This retraction does not always take place, and secondary resections have to be made. In those cases where the lung has retracted into a mass the size of the fist a cure cannot be accomplished even when, according to Schede's method of thoracoplasty all the available ribs have been resected, for the scapula, clavicle and first rib form a vault which can not be filled. But the resection of a few ribs, at the lowest point, will form a permanent fistula and greatly improve the condition of the patient.

Dr. Kuester maintains that every case of empyema is an indication for operation, even when occurring in markedly tuberculous patients.

He has operated in all on 109 cases, including some old cases of bronchial and thoracic fistulae. His results are as follows: Complete cure in 60, or 52.04% of cases; not cured 17, or 15.59%; died 32, or 29.35% of the cases. Only 6 deaths were directly due to the operation, viz., collapse 3, abscesses which had been overlooked 1, excessive suppuration 1, poisoning by carbolic acid 1.

On dividing his cases into the six following groups the results are much better than appear at first glance.

1. Non-complicated cases of empyema operated within the first six weeks, 44; cured 35, or 79.54%; improved 3, or 6.81%; died 6, or 13.37%.
2. Non-complicated cases operated on later, 12; cured 8, or 66.66%; improved 2, or 16.66%; died 2, or 16.66.
3. Previously improperly treated cases with thoracic fistulae and profuse discharge, 15; cured 7, or 44.66%; not cured 3, or 20%; died 5, or 33%.
4. Empyema with gangrene of the lung, 2 cases; cured, 1; died, 1.
5. Complicated cases with carcinoma, noma, meningitis, diphtheria and smallpox, 5; cured, 1; died, 4.
6. Complicated cases. Tuberculosis, 31; cured, 9, or 29.03%; improved, 9, or 29.03%; died, 13, or 41.93%.

The latter group of cases is of special interest, for most all physicians give phthisis as a contraindication for the operation of empyema, but the relief afforded to the patient is so great that the operation is worth trying, even at great risk.

Kuester's statistics are the largest yet published, and he claims that his method of treatment, though it appears severe, causes the least inconvenience to the patient. The objections which can be urged against his operation are the difficulty and danger of its performance, the minuteness of the after treatment, and finally the permanent damage to the chest wall, which it causes.

He claims that the operation can be easily performed by any physician, and that the time consumed should not be over 4 minutes on a child, and 6 to 8 minutes on an adult. The dangers of the operation are partly from hemorrhage, but this can be easily controlled by forceps and ligature, and partly from the sudden escape of the fluid, but he has never seen any danger arise from this source. One of the dangers on which he lays special stress is the one from narcosis; for all persons who have suffered from empyema for a long time have a weak heart, and the functions of such a heart are easily abolished. The danger is increased when the patient is turned over on the healthy

side, as the expansion of the chest is interfered with on that side; to obviate this, as much of the fluid as possible should be evacuated through the anterior incision before the patient is turned over in order to make the counter incision, or, still better, he has operated on some of his patients in the sitting posture.

The after-treatment is perfectly simple, for the outflow is so perfect that a change of dressing is not required very often, and there is no need of a daily washing out of the cavity. A dressing may be left on for a week.

There is not much danger of permanent deformity after resection of a rib, especially in children, where the bone is most always completely reformed. The deformity, if any, is not due to the resection, but to a retraction of the thorax wall on the affected side, caused, in a great measure, by a contraction of the contents of the cavity, which contraction cannot be prevented.

Prof. Kuester hopes that within the next 10 years his treatment of empyema will have found general adoption.

II. Suppuration in Cavities Completely Surrounded by Rigid Walls. In these cases the cavities are lined by a mucous membrane, and a cure can not be effected till it returns to a normal condition, or by its destruction by cicatrization. The greater the difficulty with which the pus escapes, the longer will suppuration be kept up. And the dryer a mucous membrane is kept the quicker will it return to normal conditions.

The first type of the above mentioned condition is empyema of the antrum of Highmore. There are at present three operative methods for the treatment of this condition. Opening the antrum through an alveolus, or attacking it on its facial surface, or opening it through the inferior nares (Mikulicz's method). Fraenkel is in favor of the last method for the reason that the others involve opening into the mouth, and hence particles of food may enter into the antrum.

There are two important objections to the operation of opening into the antrum through the nasal passage; first, a thorough examination of the antrum is not possible, and second, as the opening is not at the most dependent part, good drainage is not secured.

The opening of the antrum by removing some of its external or a cial wall is the best method and is perfectly easy; it can be made of any desired size, and, moreover, in the upright position of the patient it is the best for drainage. The only objection is the possible entrance of food or that at times a permanent fistula remains between the mouth and antrum.

To prevent this Kuester makes a subperiosteal resection in the following manner: He makes a small muco-periosteal flap with the base directed upward, and reaching from the root of the first premolar tooth to that of the first molar; he then opens the antrum either with a knife or a small chisel and the bony ridge above the bottom of the cavity is removed with a gouge. The cavity is then washed out thoroughly and loosely packed with iodoform gauze, and in a few days the tampon is replaced by a fine drainage tube. The periosteal flap has the advantage that it can be turned down in place and will heal rapidly. If a small fistula should remain it can easily be touched with the cautery, or a plate covering the gums can easily be made by a dentist, and all food particles will be effectually prevented from entering the antrum.

Suppuration of the Frontal Sinus.—He advises in this condition the following mode of operation. The opening of the sinus over the supra-orbital ridge, seeking for its duct, which opens in the middle meatus of the nose, and if this is not found, making an artificial opening from the bottom of the sinus into the nose by means of either a fine trocar or a sharp spoon, introducing a drainage tube in this opening and leaving it in position for some days, and finally replacing it by a strand of silk, so that a permanent fistula is formed.

Kuester has employed this method in two cases and has obtained excellent results.

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